

## CLAIMS

1. Procedure for the cold processing of tubular metal elements or other elements with dead or through holes, nuts or similar, comprising the following machining stages:
- 5
- setting up and preparation of a blank (10) in rolls or bars of full metal material;
  - straightening in the case of rolls and cutting of the metal material (10) into pieces of a determined length;

10

  - pressing in sequence achieved by passing these pieces sequentially through a plurality of work stations (31) of a work centre consisting of several presses in order to obtain a blank element presenting one or two longitudinally opposite dead holes (19) separated by a central transverse section (20);

15

  - the through drilling of the blank by removal of this central transverse section (20).
- 20
2. Procedure for the cold processing of metal elements such as standard and special shape extruded or pressed screws, etc., comprising the following machining stages:
- setting up and preparation of a blank (10) in rolls or bars of full metal material;

25

  - straightening, in the case of rolls, and the cutting of this metal material (10) into pieces of a determined length;
  - pressing in sequence achieved by passing these pieces sequentially through a plurality of work stations (31) of a multi-press plant in order to obtain a finished element (20) with or without swarf

30

or waste.

3. Procedure according to any one of the claims 1 and 2, in which the setting up and preparation of the full blank (10) differs according to the metal material used.
- 5 4. Procedure according to claim 3, carried out on material consisting of stainless steel, characterised in that the stainless steel is initially treated by solution annealing and pickled in a balanced solution of sulphuric acid, hydrofluoric acid, potassium permanganate and hydrogen peroxide, and subsequently washed repeatedly by means of immersion in a salting tank in order to facilitate the pressing.
- 10 5. Procedure according to claim 3, carried out on material consisting of low-alloy steel, characterised in that this material is pickled in sulphuric acid and subsequently washed in a phosphating tank in which, by chemical reaction, a layer of zinc phosphate is created on the surface of the piece, then immersed in a sodium stearate tank where, again by chemical reaction, a thin layer of zinc stearate forms on top of the previous layer of zinc phosphate.
- 15 20 6. Procedure according to claim 2, characterised in that the products undergo shearing, for example for hexagonal-head screws, which can be carried out by means of a mechanical press.
- 25 7. Procedure according to any one of the claims from 2 to 6, carried out on starting material in the form of rolls, in which the previously washed metal material is straightened by loading it on a wire-straightening unit designed to unroll the skein.
- 30 8. Procedure according to any one of the claims from 2 to

6, carried out on starting material in the form of bars, in which these bars are loaded in bundles in a bar sectioning plant and in which the bars are presented at the cutting station in a synchronised way according to the needs of the machining centre consisting of the presses.

9. Procedure according to claim 7, in which the free end of the roll is pulled through a first set of rollers and then through a system of opposite rollers designed to straighten the wire and transfer it to a cutting unit.

10. Procedure according to any one of the claims 8 and 9, in which the material is cut into pieces of a predetermined length, advantageously by various possible procedures such as for example mechanical or hydraulic processes by means of one or mobile blades or by a circular saw.

11. Procedure according to any one of the preceding claims, characterised in that the plant or machining centre (30) consists of a series of hydraulic presses of various sizes and power levels (31-34) connected by a transfer unit designed to move the pieces (10) being machined.

12. Procedure according to claim 11, characterised in that the transfer unit consists of a series of gripper units (40-44) powered by an appropriate source of energy.

13. Procedure according to any one of the preceding claims, characterised in that the drilling or shearing is carried out by a special unit consisting of a vertical press.

14. Procedure according to claim 13, characterised in that this vertical press consists of a mechanical press.

15. Procedure according to any one of the preceding claims characterised in that the functioning and

synchronisation of the individual presses and of the transfer unit are controlled by a PLC or a microprocessor.

- 5 16. Plant for the implementation of a procedure according to any one of the preceding claims, characterised in that it comprises a series of hydraulic presses adjacent to each other, designed to carry out a successive series of pressing operations on pieces to be machined which are transferred from one press to another by means of
- 10 appropriate automated manipulators.
17. Plant according to claim 16, characterised in that it also comprises a drilling or shearing station.
18. Plant according to claim 17, characterised in that this
- 15 drilling or shearing station consists of a vertical mechanical press.